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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

CHUNG, DAVID Y

ART UNIT PAPER NUMBER

2871

DATE MAILED: 07/09/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application N .

10/053,940

Applicant(s)

SUN ET AL.

Examiner

David Y. Chung

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1,2,9-13,15-17 and 19-24 is/are rejected.
- 7) ☒ Claim(s) 3-8,14 and 18 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. Claims 1, 2 and 15 rejected under 35 U.S.C. 102(b) as being anticipated by Kowel et al. (U.S. 4,572,616).

As to claims 1 and 2, Kowel et al. discloses an adaptive liquid crystal lens having an electro optical cell containing a pair of spaced apart flat plates, a plurality of spaced apart transparent electrodes disposed inside the plates, a liquid crystal material contained between the plates, and control means for varying the voltage applied to each of the electrodes to provide point to point control over the index of refraction of the material to bring incoming light to focus at a plane. See column 2, lines 29-38. Note in figure 7, closed loop control electrodes 67. The control electrodes are configured on the front window of the cell in a circular bulls eye pattern centered upon the axis. See column 7, lines 30-35.

As to claim 15, Kowel et al. discloses an address system for regulating the voltage applied to the control electrodes contained in the cell. The liquid crystal lens is further controlled electrically to correct for aberrations as shown in figure 4. A photoelectric sensor 90 is positioned so that it can view an image 91 created by the device at the image plate 93 of lens 10. The signal from the sensor is delivered to a sensor controller 94, which compares the sensed image information with a predetermined optimum value. In the event the sensed image information is less than optimum, the controller, acting through the microprocessor, adjusts the voltage on the appropriate electrode or electrodes to bring the image to a desired operating level. See column 8, lines 12-25.

2. Claims 1, 9, 10 and 12 rejected under 35 U.S.C. 102(b) as being anticipated by Matsuo et al. (U.S. 5,414,547).

As to claim 1, Matsuo et al. discloses a liquid crystal display device having closed loop black matrix electrodes electrically connected to the pixel electrode. Note in figures 1 and 2, the closed loop black matrix electrodes 116, pixel electrodes 106, and electrical contact 115a. Since the closed loop black matrix electrodes are electrically connected to the pixel electrodes, they are adapted to receive the same variable control voltage applied to the pixel electrodes, which adjusts the refractive index of the liquid crystal layer and modulates the light passing through the liquid crystal cell. A counter

electrode (reference plate) is formed on the opposing substrate and is in electrical communication with the liquid crystal layer.

As to claim 9, figures 1 and 2 of Matsuo et al. show a plurality of conductors 106, an insulating layer 115 on the conductors, and closed loop electrodes 116 on the insulating layer and electrically connected to the conductors by via 115a. Liquid crystal is deposited on the closed loop electrodes and a reference plate is formed on an opposing substrate adjacent the liquid crystal layer.

As to claim 10, figure 2 of Matsuo et al. shows a via 115a electrically connecting the closed loop electrode 116 to the conductor 106.

As to claim 12, the closed loop electrode 116 shown in figure 2 of Matsuo et al. is formed of conducting material formed upon insulating layer 115.

3. Claims 9, 10, 12 and 13 rejected under 35 U.S.C. 102(b) as being anticipated by Suzuki et al. (U.S. 4,333,720).

As to claim 9, Suzuki et al. discloses a stop control device arranged to have variable light transmission. Note in figure 5(1), conductors 3a-1, 3b-1, 3c-1, 3d-1, 3e-1, 3f-1, 3g-1 and 3h-1. Note also in figure 5(2), closed loop electrodes 3a, 3b, 3c, 3d, 3e, 3f, 3g and 3h. The closed loop electrodes are arranged in concentric circles with each

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electrode in electrical contact with one conductor. Note in figure 5(2), insulating layer 20 is deposited between the conductors and closed loop electrodes. A layer of liquid crystal 5 is deposited upon the closed loop electrodes and a reference plate 4 is deposited on the liquid crystal layer as shown in figures 2(1)B and 2(2)B.

As to claim 10, each of the closed loop electrodes disclosed by Suzuki et al. is connected to a corresponding conductor by a via.

As to claim 12, each of the closed loop electrodes disclosed by Suzuki et al. comprises electrically conductive material formed upon insulating layer 20, as shown in figure 5(2).

As to claim 13, the closed loop electrodes disclosed by Suzuki et al. are formed in a concentric circles as shown in figure 5(1).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claim 11 rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki et al. (U.S. 4,333,720).

Suzuki et al. does not disclose forming an etch mask defining at least one opening upon the insulating layer and etching a hole within the opening so that the hole extends through the insulating layer. However, it was common and convention to form holes in an insulating layer by etching using a mask. It would have been obvious to one of ordinary skill in the art at the time of invention to form the holes in the insulation layer by etching with a mask because of the benefits associated with conventional methods such as cost-effectiveness.

5. Claims 16, 17 and 19-24 rejected under 35 U.S.C. 103(a) as being unpatentable over Kowel et al. (U.S. 4,572,616) in further view of Hill (U.S. 6,480,285) and MacAulay (U.S. 6,388,809).

As to claims 16 and 21, Kowel et al. discloses that the sensor controller 94 compares the sensed image information with a predetermined optimum value and adjusts the voltage on the electrodes through the microprocessor if necessary. Kowel et al. does not disclose that the sensor controller 94 adjusts the variable control voltage based upon a point spread function of the light captured by sensor 90. However, it was well known and obvious that it was necessary to adjust the variable control voltage based on the point spread function in order to correct for aberrations as shown by Hill

and MacAulay. Hill teaches that if the systems point spread function is known and images are obtained for each independent section of the object, known computer algorithms can be applied to such images to effectively remove the signal contributed by the out-of-focus light and produce images that contain only in-focus data. See column 2, lines 1-10. MacAulay teaches that the interaction of a reflective surface or other light-emitting material and the point spread function formed by a confocal microscope results in out-of-focus information that can be measured. Comparing the measurements in the X-Y plane can improve the resolution along each of the x, y, and z-axes, increase the number of photons used in the system, thus improving the signal to noise ratio, and help correct for aberrations. See abstract. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to adjust the variable control voltage based on a point spread function in order to correct for aberrations.

As to claims 17 and 22, Kowel et al does not disclose a lens capable of directing light, and a polarizer capable of polarizing light in a predefined orientation. However, lenses were common and conventional within large optical systems for directing light into a liquid crystal cell because of their ability to focus and condense light. Polarizers were common and conventional in liquid crystal cells because the liquid crystal layers modulated polarized light. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to provide a lens and polarizer because of the benefits

associated with conventional structures such as well-understood behavior and well-established supply chains and manufacturing methodologies.

As to claims 19, 20, 23, and 24, Kowel et al. does not disclose that the sensor controller adjusts the variable control voltage based on one or more comparisons of the point spread function at each control voltage applied to each subset of closed loop electrodes. However, it was well known and obvious to do this in order to accurately focus the liquid crystal adaptive lens. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to compare the point spread function at each control voltage applied to each subset of the closed loop electrodes in order to accurately focus the adaptive lens.

6. Claim 11 rejected under 35 U.S.C. 103(a) as being unpatentable over Matsuo et al. (U.S. 5,414,547).

Matsuo does not disclose forming an etch mask defining at least one opening upon the insulating layer and etching a hole within the opening so that the hole extends through the insulating layer. However, it was common and convention to form holes in an insulating layer by etching using a mask. It would have been obvious to one of ordinary skill in the art at the time of invention to form the holes in the insulation layer by etching with a mask because of the benefits associated with conventional methods such as cost-effectiveness.


Allowable Subject Matter

7. Claims 3-8, 14 and 18 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: none of the prior art taught or suggested a liquid crystal adaptive lens as recited in claim 1, further comprising at least one pair of conductors in electrical contact with at least two closed loop electrodes and at least one connector electrically connecting at least two closed loop electrodes.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David Chung whose telephone number is (703) 306-0155. The examiner can normally be reached on Monday-Friday from 8:30 am to 5:00 pm.


ROBERT H. KIM
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06/30/03